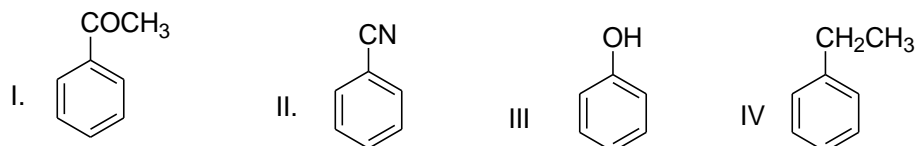




**EDO UNIVERSITY IYAMHO, EDO STATE**  
**FACULTY OF SCIENCE**  
**DEPARTMENT OF CHEMISTRY/PHYSICS**  
**2017/2018 FIRST SEMESTER EXAMINATION**  
**COURSE CODE: CHM 312**  
**COURSE TITLE: ADVANCED ORGANIC CHEMISTRY**

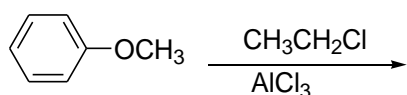
**INSTRUCTION: ANSWER FOUR QUESTIONS IN ALL**  
**TIME ALLOWED: 3 HOURS**

(1a). Draw the products formed when each compound is treated with  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$ . State whether the reaction occurs slower or faster than a similar reaction with benzene.

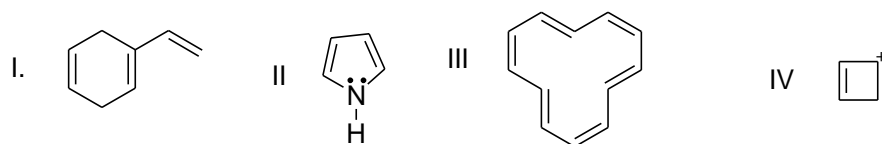


(1b). Outline the synthesis of cyclopropane using  $\alpha,\omega$  dihalide compounds

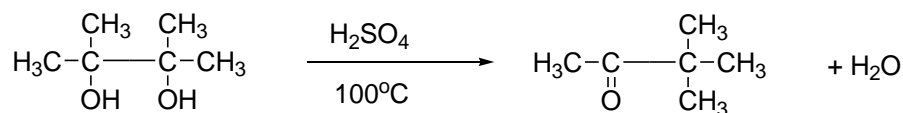
(1c). Draw and name the product(s) of the following electrophilic aromatic substitution reaction



(1d). Label each compound as aromatic, antiaromatic or not aromatic. Give reasons for your answer. Assume all completely conjugated rings are planar.



(2a) Predict the mechanism of following Pinacol-Pinacolone reaction

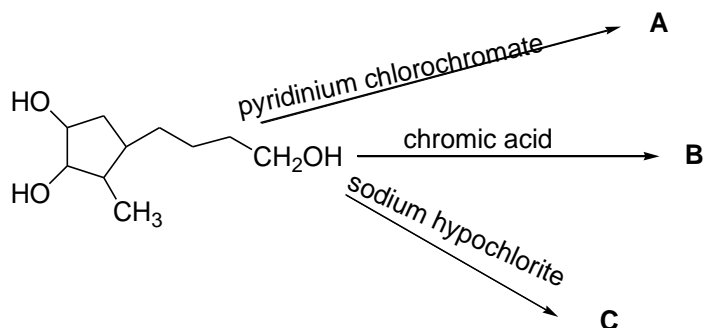


(2b) i. How would you use simple chemical test to distinguish between propanol and tert-butylalcohol?

ii. Two unknowns, X and Y, having molecular formula  $\text{C}_4\text{H}_8\text{O}$ , give the following results with four chemical tests. Propose the structures for X and Y constituents with these information:

	<b>Bromine water</b>	<b>Na metal</b>	<b>Chromic acid</b>	<b>Lucas reagent</b>
compound X	Decolourizes	bubbles	orange to green	no reaction
compound Y	no reaction	no reaction	no reaction	no reaction

(2c). Give the structures of the lettered products below:



(3a). Show how you would use the Williamson ether synthesis to prepare cyclohexylpropylether

(3b). With the aid of equations, briefly discuss why ethers are not stored for a long time on exposure to atmospheric oxygen.

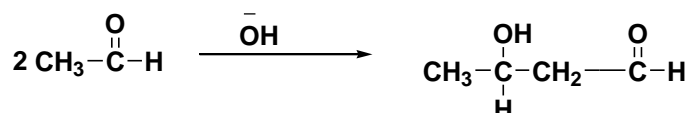
(3c). Give the structures of the following compounds

- i. trans-2,3-dimethyloxirane    ii. 3,4-epoxy-4-ethyl-2-methylhexane
- iii. 2-ethyl-3,3-dimethyloxetane

(3d). Show how you would convert 2-methylcyclohexanol to the following products.

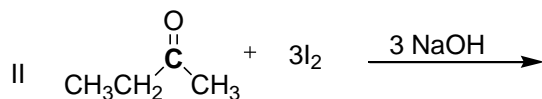
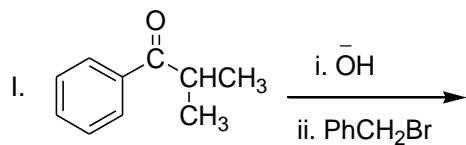
- i. 1-methylcyclohexene
- ii. 2-methylcyclohexanone
- iii. 2-methylcyclohexylacetate

(4a). The reaction between 2 moles of ethanal in an alkaline medium is represented by the equation:

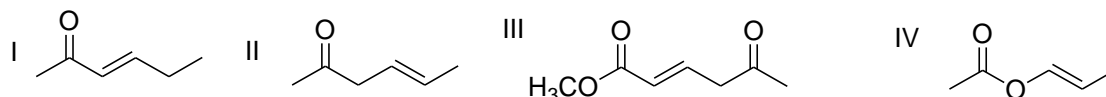


- i. Name the reaction
- ii. Write a generally acceptable mechanism for the reaction

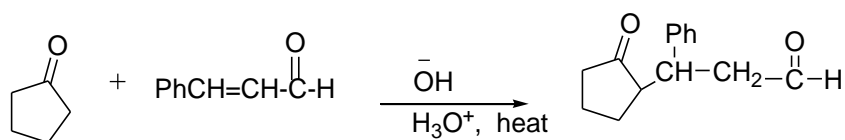
(4b). Predict the product of the following reactions



(4c). Which of the following compounds can act as Micheal acceptor (s)



(4d). Propose a mechanism for the reaction below:



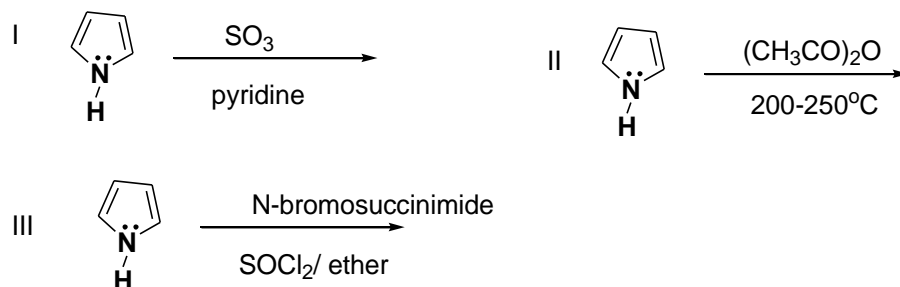
(5a). Outline the synthesis of 2,5-dimethylpyrrole by the Paal–Knorr method

(5b). Electrophilic aromatic substitutions on pyrrole ring occur preferentially at C-2 rather than C-3. Justify this statement with the aid of resonance structures.

(5c). Give the structures of the following heterocycles:

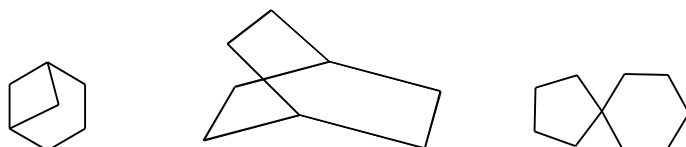
- i. 3-methoxyfuran    ii. Benzo[b]pyridine    iii. 2,3-dihydropyridine

(5d). Predict the products of the following reaction



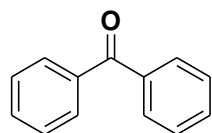
(6a). 3- and 4-membered rings are generally less common than 5- or 6-membered rings. Justify this statement using the Baeyer's theory.

(6b). Name the following compounds



(6c) i. Outline the synthesis of the cyclohexene using Diels-Alder reaction.

(6c) ii. Starting from benzene, outline the synthesis of benzophenone



benzophenone

(6d). Give the structures of the lettered compounds

